REMARKS

Figure 1 has been labeled as "prior art".

A replacement abstract has been included.

The title has been amended.

Page 5 has been amended.

Claim 56 has been amended for clarity.

Claim 66 has been canceled.

The Examiner rejected claims 1-14, 17-19, 21-25, 30-32, 34, 35, 40-42, 55-65, 67-72, and 78-85 as being anticipated by Sukthankar et al.

Sukthankar et al. disclose a projection system that includes a projector, computer, and camera for keystone adjustment. In particular, Sukthankar et al. disclose a system that is flexible such that the projector 12 can be mounted anywhere as long as the image falls entirely within the projection 16 surface area. The camera 18 must be mounted such that the projection surface 16 is within its field of view, but the camera can be placed anywhere in the room and need not be level. The exemplified setup includes a computer, a low-resolution digital camera, and a standard LCD projector. See, column 3, lines 50-60.

Claim 1 patentably distinguishes over Sukthankar et al. by claiming that the imaging device and the projector are maintained in a fixed relationship with respect to one another. The Examiner notes that this is not explicitly stated in the flow chart of Figure 2. In fact, the applicant would suggest that in fact Sukthankar et al. teach that the projector and imaging device are NOT maintained in a fixed relationship with respect to one another in order to maintain system flexibility. In addition, claim 1 patentably distinguishes over Sukthankar et al. by

claiming that the imaging device is free from including the projector optics from which the image is projected from the projector.

Claims 2-9 depend from claim 1 and are patentable for the same reasons asserted for claim 1.

Sukthankar et al. disclose that the keystone correction may be performed automatically. In addition, Sukthankar et al. disclose that using a combination of manual and automatic hardware and software distortion correction may result in optimal performance. In particular, the system could perform automatic focusing through the hardware interface, followed by fully automatic keystone correction in software and interactive placement of the final corrected image 20.

Claim 10 patentably distinguishes over Sukthankar et al. by claiming the adjusting of the focus of the projector (step c) and steps (b), (d), (e), and (f), all without user input.

The applicant would note that Sukthankar et al. disclose the use of a computer, digital camera, and a standard LCD projector. See, column 3, lines 50-60. In this suggested configuration, the system performs focusing by pressing a button on the LCD projector. See Figure 1. Accordingly, the "automatic focusing through the hardware interface" refers to pressing a button on the LCD projector (hardware). In the suggested configuration, the system performs keystone correction using the computer. See Figure 1. Accordingly, the "automatic keystone correction in software" refers to pressing a key on the computer (software).

Sukthankar et al. fail to teach nor suggest that the computer (which is providing the image data to the projector) has any control capabilities over the projector, such as automatic focusing. Accordingly, Sukthankar et al at most suggest the automatic focusing by the user controlling the LCD projector and then subsequently the user controlling the computer to

perform keystoning. Thus to accomplish both automatic focusing and automatic keystoning the user must initiate at least two processes.

Claims 11-17 depend from claim 10 and are patentable for the same reasons asserted for claim 10.

Claim 18 patentably distinguishes over Sukthankar et al. by claiming adjusting the focus of the projector in response to initiating the keystoning adjustment process free from user input.

Sukthankar et al. teach the automatic focusing of the projector by operating the projector, then subsequently automatic keystoning by using the computer. There is no suggestion of adjusting the focus of the projector in response to initiating the keystoning adjustment process. In fact, they are explicitly separate operations on the system taught by Sukthankar et al.

Claims 19-23 depend from claim 18 and are patentable for the same reasons asserted for claim 18.

Sukthankar et al. teach in column 4 lines 13-24 that for semi-automatic calibration the computer projects an image depicting several calibration regions, and the user manually identifies the location of these regions in the camera image. From these correspondences, the system automatically computes the mapping. Accordingly, Sukthankar et al. teach the presentation of calibration images, the user manually identifying regions, and then performing the resulting calibration.

Claim 24 patentably distinguishes over Sukthankar et al. by claiming repeating steps (b) through (d) while the user continuously maintains the desired keystone adjustment.

Claims 25-33 depend from claim 24 and are patentable for the same reasons asserted for claim 24.

Sukthankar et al. teach that for manual calibration, the camera and projector are mounted in a known position and orientation and the internal optical parameters of the components are specified. These internal optical parameters apparently have to do with the physical configuration of the device itself, and are not suggestive of setting the user setting the ratio of the width to length.

Claim 34 patentably distinguishes over Sukthankar et al. by claiming the projector receiving user input indicating a desired modification of the ratio of the width to length of the image projected from said projector.

Claims 35-43 depend from claim 34 and are patentable for the same reasons asserted for claim 34.

Sukthankar et al. teach the use of internal optical parameters of the internal optical parameters of the components for manual calibration. For semi-automatic calibration the system uses projected calibration regions. For automatic calibration the system does not use any user interaction for the mapping of the projected calibration regions of the semi-automatic system. See column 4, lines 8-24. Accordingly, Sukthankar et al. fail to teach the inclusion of calibration parameters characterizing different optical settings of the projector optics for an automatic system (e.g., free from user input).

Claim 55 patentably distinguishes over Sukthankar et al. by claiming projecting the modified image from the projector, wherein the projector includes calibration parameters characterizing different optical settings of the projector optics from which the image is projected of the projector, wherein steps (a), (b), (c), and (d) are free from user input.

Claims 56-64 depend from claim 55 and are patentable for the same reasons asserted for claim 55.

Sukthankar et al. teach, as described above, that the auto-focus and keystoning are performed by separate actions by the user.

Claim 65 patentably distinguishes over Sukthankar et al. by claiming that the auto-focus, auto-positioning, auto-zooming, transformation, and modifying are performed free from user interaction with the projector.

Claims 66-72 depend from claim 65 and are patentable for the same reasons asserted for claim 65.

Sukthankar et al. teach the detection of a projection screen based upon the light from the projector. An image is projected onto the projection screen, as illustrated in FIG. 4, and the system determines boundaries of the projection screen.

Claim 78 patentably distinguishes over Sukthankar et al. by claiming projecting the modified image from the projector, wherein the imaging device and the projector are maintained in a fixed relationship with respect to each other, wherein the imaging device is free from being the projector optics from which the image is projected from the projector.

Claims 79-83 depend from claim 78 and are patentable for the same reasons asserted for claim 78.

Sukthankar et al. teach the determination of the boundaries of the physical projection surface based upon sensing the entire projection surface, including all the boundaries thereof. In particular, Sukthankar et al. teach that the camera must be mounted such that the projection surface is within its field of view. See, column 3, lines 54-60.

Claim 84 patentably distinguishes over Sukthankar et al. by claiming sensing using the imaging device at least two boundaries and less than four boundaries defining the projection screen.

Claim 85 depends from claim 84 and is patentable for the same reasons asserted for claim 84.

The Examiner rejected claims 26, 36, and 44-54 as being unpatentable over Sukthankar et al. in view of Geng.

Claim 44 patentably distinguishes over Sukthankar et al. in view of Geng by claiming the projector using statistical inference to select the matching pairs for said location of said screen, wherein an imaging device receives the image and the projector are maintained in a fixed relationship with respect to each other, wherein the imaging device is free from being the projector optics from which the image is projected from the projector.

Claims 45-48 depend from claim 44 and are patentable for the same reasons asserted for claim 44.

Claim 49 patentably distinguishes over Sukthankar et al. in view of Geng by claiming projecting the modified image from the projector, wherein the plurality of imaging devices is free from including the projector optics from which the image is projected of the projector, wherein the imaging devices and the projector are maintained in a fixed relationship with respect to each other, wherein at least one of the imaging devices is free from being the projector optics from which the image is projected from the projector.

Claims 50-54 depend from claim 49 and are patentable for the same reasons asserted for claim 49.

Respectfully submitted,

Kevin L. Russell
Reg. No. 38,292
Tel No.: (503) 227-5631

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: United States Patent and Trademark Office, P.O. Box 1450, Alexandria, Virginia 22313.

Dated: December 21, 2004 George Painter